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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,048	03/26/2004	Roel Wirix-Speetjens	IMEC299.001AUS	7916

20995 7590 06/28/2005

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EXAMINER

LUM, LEON YUN BON

ART UNIT	PAPER NUMBER
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1641

DATE MAILED: 06/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/810,048

Applicant(s)

WIRIX-SPEETJENS, ROEL

Examiner

Leon Y. Lum

Art Unit

1641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 1-21, 37 and 38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-32, 34, 36 and 39 is/are rejected.
- 7) ☒ Claim(s) 33 and 35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 29 June 2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 22-36 and 39 in the reply filed on 20 April 2005 is acknowledged.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The abstract of the disclosure is objected to because it contains that legal term "wherein" (line 3). Correction is required. See MPEP § 608.01(b).

Claim Objections

4. Claim 31 is objected to because of the following informalities: there is no period to conclude the end of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 22-32, 34, and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Deng et al (Applied Physics Letters, 2001).

Deng et al teach a microfabricated circuit with two current-carrying wires that can manipulate and transport magnetic microbeads along a path by generating magnetic-field maxima that fluctuate between the wires by increasing and decreasing the magnetic fields (i.e. non-constant charge current density; series of field minima of magnetic fields), wherein the wires are separated vertically and horizontally by spacings of ~50 um and ~100 um, respectively (i.e. electrically isolated), wherein the current in the circuit is controlled by a voltage source (i.e. switchable current supply). In addition, Deng et al teach that B-field minima can be utilized. See page 1776, left column, 2nd paragraph; and Figures 1-3 and captions.

With regards to claim 24, Deng et al teach that the circuits are produced by soft lithography (i.e. microelectronic process technology). See page 1777, right column, lines 3-4. In addition, it is noted that the instant claim recites a product-by-process claim, which is limited only by the structure recited in the steps, not by the manipulations of the steps. See MPEP § 2113.

With regards to claims 25-31, 34, Deng et al teach that the wires form a zig-zag pattern along the direction of current flow, thereby producing different cross-sectional dimensions and area when taken perpendicular to the direction of current flow (i.e. current-carrying structures vary in shape and area). In addition, the zig-zag pattern is periodic, formed by successions of a an incomplete square separated by a linear region (i.e. periodic shape, formed by a repetitive structural element; isometric). Furthermore, the two current-carrying wires are positioned adjacent to each other, wherein the periodic structures are shifted linearly in phase (i.e. substantially the same shape and size, positioned in parallel next to each other, shifted by a distance different from 0). See page 1776, left column, 2nd paragraph; and Figure 4 and caption.

With regards to claim 27, although Deng et al do not explicitly teach that the non-constant charge current density is generated by varying the width of said current carrying-structure along the direction of current flow, since the zig-zag pattern creates a difference in width between the incomplete square and linear regions, the width is considered to vary along the current-carrying wire. In addition, Deng et al teach that local field maxima created by the wires trap the magnetic beads, thereby indicating that

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the structural decrease in width in the wires inherently provide the non-constant charge current density. See page 1776, left column, 2nd paragraph.

With regards to claim 29, an axis orthogonal to the current flow at the intersection of the incomplete square and linear region would produce a pattern on either side that is asymmetrical with respect to the axis. See Figure 2.

With regards to claim 30, since the zig-zag pattern is periodic, cross-sections taken of the incomplete square followed by the linear region would result in a decreased cross-sectional surface area as claimed. See Figure 2.

With regards to claim 39, Deng et al teach that the microfabricated system can be placed in detection microcells (i.e. biochip). See page 1777, right column, 1st paragraph.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Deng et al (Applied Physics Letters, 2001) in view of Aiken et al (US 4,021,790).

Deng et al reference has been disclosed above, but fails to teach that said structural element is sawtooth like.

Aiken et al teach a circuit in a sawtooth pattern, in order to provide an alternative layout to propagate a magnetic domain. See column 1, lines 10-23; column 4, lines 19-33; and Figure 3.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Deng et al with a circuit in a sawtooth pattern, as taught by Aiken et al, in order to provide an alternative layout to propagate a magnetic domain. One of ordinary skill in the art at the time of the invention would have had reasonable expectation of success in including a sawtooth circuit, as taught by Aiken et al, in the apparatus of Deng et al, since Deng et al teach the propagation of magnetic beads, and the sawtooth circuit of Aiken et al is capable of moving magnetic domains that would propagate magnetic beads.

Allowable Subject Matter

10. The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 33 and 35, while the prior art teaches current-carrying structures that are parallel in planar fashion (see rejection supra), the prior art does not teach current-carrying structures of substantially the same shape and size that are stacked on top of each other, each being shifted by a distance different from 0 along the direction of current flow, wherein the shifted distance equals half the length of the structural element.

Claims 33 and 35 are therefore objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims

Conclusion

11. Claims 22-32, 34, 36, and 39 are rejected.

12. Claims 33 and 35 are objected to.

13. The prior art made of record and not relied upon is considered to be pertinent to Applicant's disclosure:

Zhou et al (US 6,355,491 B1) teach biochips with micro-electromagnetic units that manipulate magnetic beads.

Wu et al (US 6,716,642 B1) teach biochips with micro-electromagnetic units that manipulate magnetic beads.

Cheng et al (US 2002/0076825 A1) teach biochips with traveling wave magnetophoresis.

Reichel et al (Physical Review Letters, 1999) teach the manipulation of neutral atoms using the magnetic field of microfabricated current-carrying conductors.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Y. Lum whose telephone number is (571) 272-2878. The examiner can normally be reached on weekdays from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

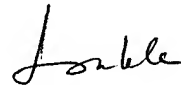
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leon Y Lum
Patent Examiner
Art Unit 1641



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06/26/05